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## Brachial plexus block in a parturient



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### ABSTRACT

We report a novel circumstance of brachial plexus anesthesia in a parturient. A 25-year-old woman at 34 weeks of gestation presented with a pathologic proximal right humerus fracture from an intramedullary mass. She was scheduled for tumor biopsy which was performed using a two-site ultrasound-guided brachial plexus block to maximize odds of complete anesthesia while minimizing the risk of phrenic nerve paresis. After a supraclavicular block with 0.5% ropivacaine 20 mL, we translated our ultrasound probe cephalad, inferior to the root of C7 where the divisions of the superior trunk could be seen in a tightly compact arrangement. An additional injection of 0.5% ropivacaine 20 mL was administered at this site, and the patient subsequently underwent successful biopsy without sedatives or analgesics, aside from local anesthetics. In the post-anesthesia care unit, she had normal respirations and oxygen saturations breathing room air, denied any shortness of breath or difficulty breathing, and was discharged shortly after her arrival. While we did not pursue radiologic examination to rule out hemidiaphragm paralysis, we assumed, as evidenced in a previous case report, that unlike most healthy patients, a parturient would demonstrate some clinical signs and/or symptoms of hemidiaphragm paralysis, given that the diaphragm is almost totally responsible for inspiration in the term parturient. This represents only the second brachial plexus block in a parturient reported in the literature; the first using ultrasound guidance and without respiratory embarrassment.

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**Keywords:** Brachial plexus block; Supraclavicular block; Hemidiaphragm paralysis; Phrenic nerve paresis

### Introduction

While the majority of non-obstetric surgery in the parturient necessitates the use of neuraxial or general anesthesia, brachial plexus block can be ideal for isolated upper extremity pathology. While it avoids changes in systemic blood pressure that are common in the aforementioned techniques, there is a high risk of concomitant phrenic nerve blockade when providing anesthesia for the shoulder and proximal humerus. Although the effects of acute

hemidiaphragm paralysis in the parturient are unknown, it could result in respiratory embarrassment. We report a novel circumstance of brachial plexus block above the clavicle for surgical anesthesia in a third-trimester parturient without respiratory compromise.

### Case report

A 25-year-old woman at 34 weeks of gestation presented with a pathologic proximal right humerus fracture on X-ray. Magnetic resonance imaging revealed a 5 × 3 × 1.8 cm mass centered in the intramedullary metadiaphysis eroding through the posterior cortex. The orthopedic and obstetrical services were consulted and recommended a

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biopsy for definitive diagnosis and avoidance of general anesthesia with employment of a regional anesthetic technique, if possible. The staff anesthesiologist in the operating room consulted with us about the feasibility of a regional anesthetic for the biopsy procedure. Of note, the patient was 168 cm tall, weighed 75 kg (body mass index 26.6 kg/m<sup>2</sup>), had a favorable airway, was appropriately fasted, and had no other significant comorbidities.

We discussed our planned brachial plexus block and the possibility of converting to a general anesthetic if needed. Our anesthesia colleague had no reservations about this as the surgeon could test for adequate anesthesia of superficial tissues and quickly halt the procedure if the block was inadequate for deeper tissues, the operative area could be covered with sterile drapes, and the patient turned supine for induction of general anesthesia. He was also available to stand-by in the regional procedure bay to assist with managing the patient's airway if respiratory embarrassment were to occur as a consequence of the brachial plexus block. With these considerations and precautions in mind, we discussed an awake regional block technique versus general anesthesia with the patient and she chose to proceed with the regional block.

We performed an in-plane lateral approach ultrasound-guided supraclavicular nerve block with 0.5% ropivacaine 20 mL with 1:400 000 epinephrine as an intravascular marker. The patient was placed in a sitting position with standard monitoring. Supplemental oxygen was administered by nasal cannula and baseline fetal heart rate was obtained by our obstetrical colleague. She was given 0.3 M sodium citrate oral solution 30 mL for antacid prophylaxis. After skin disinfection, 2% lidocaine 2–3 mL was administered for skin anesthesia at the site of needle entry. Using a M-Turbo® ultrasound with a HFL50x 15–6 MHz linear probe (FUJIFILM SonoSite, Inc. Bothell, WA, USA) and a Stimuplex®A, 22-gauge 50 mm insulated needle (B. Braun Medical Inc. Melsungen, Germany), after penetrating the plexus sheath, we injected 10 mL at the junction of the subclavian artery and first rib, 5 mL at the posterolateral boundary and 5 mL at the superior boundary in 2–3 mL aliquots after negative aspiration. We observed real-time injectate spread and ensured that there was no spread medial to the subclavian artery or extravasation outside the sheath. The needle was withdrawn and the ultrasound probe moved and angled in a cephalad direction inferior to the root of C7 where the divisions of the superior trunk could be seen in a tightly compact arrangement. In similar fashion as above, after penetrating the plexus sheath at the posterolateral boundary at this level, we injected 20 mL of the same solution in 2–3 mL aliquots with minor needle adjustments to observe circumferential spread around the neural structures without extravasation outside of the sheath. No pares-

thesias were elicited and there were no signs or symptoms of local anesthetic toxicity.

The patient tolerated the procedure well and was subsequently transferred to the operating room. She was placed in the left lateral decubitus position and underwent a successful and uneventful biopsy procedure under monitored anesthesia care, after which she was transferred to the post-anesthesia care unit (PACU). Our obstetrical colleagues reassessed the fetal heart rate without any new concerns. No sedatives or analgesics, aside from local anesthetics, were administered during either procedure. She was discharged shortly after arrival to the PACU breathing normally and comfortably with normal oxygen saturations on room air.

As the patient had just arrived from overseas, she was admitted overnight until accommodation could be made for her and her spouse. She was prescribed oral oxycodone 5 mg/acetaminophen 325 mg, two tablets every four hours as needed for pain. Her block lasted approximately 14 h and she required no analgesics during that period. After her block receded, she received three oxycodone/acetaminophen tablets over the following 10 h.

Pathology results of the biopsy specimens revealed osteosarcoma. At 36 weeks of gestation, she was scheduled for induction of labor that was complicated by fetal tachycardia and maternal fever. She was diagnosed with chorioamnionitis and treated with antibiotics. A healthy female infant with Apgar scores of 8 and 8 at 1 and 5 min, respectively, delivered vaginally without further complications. Mother and baby were discharged from the hospital after a routine stay. The patient subsequently underwent neoadjuvant chemotherapy for 10 weeks followed by tumor excision and further chemotherapy for an additional 18 weeks.

## Discussion

Initially, we had concerns about adequately anesthetizing possible biopsy sites without adversely impacting the patient's respiratory function. While complete diaphragmatic paralysis alone does not cause respiratory failure in healthy patients,<sup>1</sup> the effects of hemidiaphragm paralysis on a parturient remains largely unknown with the ability to compensate likely somewhere between a healthy patient and one with severe lung disease.

We will briefly review the common approaches to brachial plexus blockade for the upper extremity using ultrasound guidance. Reviews on nerve stimulation techniques can be found in major anesthesiology textbooks and several published articles. The most proximal approach is at the root/trunk level in the interscalene groove. As the nerve roots emerge from their respective neuroforamina, they course slightly posteriorly and superiorly. However, unlike the cervical plexus, as these neural elements course towards the surface, they do not

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